Missouri STEM Report 2018-2028

DEPARTMENT OF
HIGHER EDUCATION &
WORKFORCE DEVELOPMENT

Missouri STEM and STEM-Related Occupations

STEM (Science, Technology, Engineering and Mathematics) and STEM-Related occupations are some of the most in-demand and highest paying jobs in Missouri. In fact, the need for such employees is projected to grow twice as fast as the average for all occupations. The projected growth rate for STEM and STEM-Related occupations from 2018-2028 is 12 percent, while the statewide average for all occupations is 4.5 percent. By 2028, the total employment for STEM and STEM-Related occupations is expected to be more than 432,000, an increase of over 46,000 jobs.

Wages for STEM and STEM-Related occupations are also higher than the average for all occupations. The average wage for all occupations in Missouri is $46,460, while the average wage for STEM and STEM-Related occupations is $78,615.

Education is the key to meeting the demand for STEM and STEM-Related workers. Of the 181 STEM and STEM-Related occupations in Missouri, 176 require some level of postsecondary education. Most occupations typically require a bachelor's degree (69 occupations) or master's degree and beyond (66 occupations). In addition, 32 occupations require an associate degree.

SCIENCE
Science includes those who conduct research and experiments in labs, as well as areas of natural science. Outdoor field work is an integral part of biological science occupations. Natural science technicians play a key role in assisting scientists in their experimentation and discovery.

TECHNOLOGY
Technology occupations are commonly found in the areas of computer information technology, but also include any occupation that requires technical skill. Technology workers create new software, develop databases, and assist users in maintaining their computer's performance.

ENGINEERING
Engineers develop and test new products. Engineers incorporate elements of science, technology and math in their work. There are Civil, Electrical and Mechanical Engineers among others, as well as drafters and technicians who provide assistance throughout the process.

MATH
Math is part of many occupations, but for some, mathematics is at the heart of what they do. Actuaries, Statisticians and Research Analysts use mathematics for risk assessment, problem solving, and various types of data analysis.
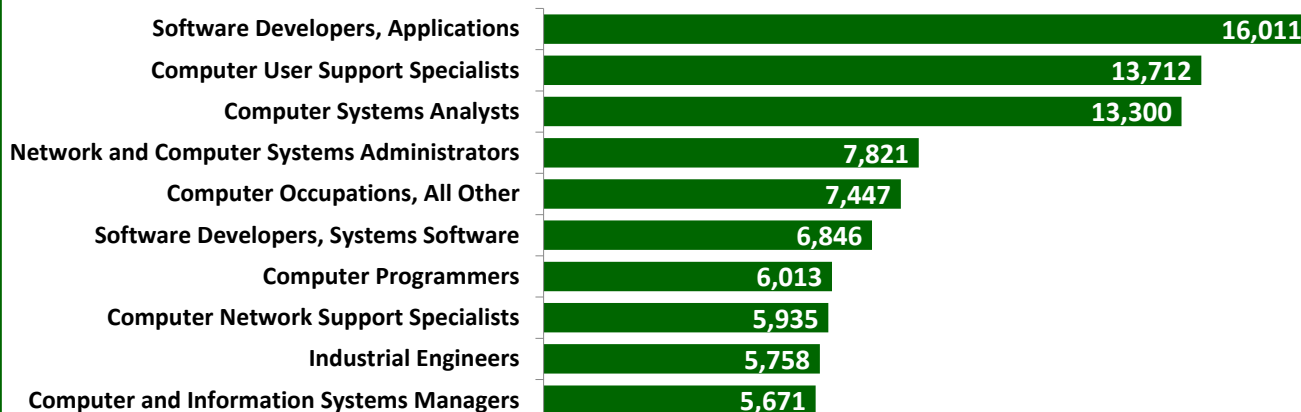
STEM-Related

These occupations include *Architecture* and *Health Care* occupations. They mainly focus on design and patient care, but also rely heavily on many of the STEM principles. In Missouri, there are 115 STEM occupations and 66 STEM-Related occupations.
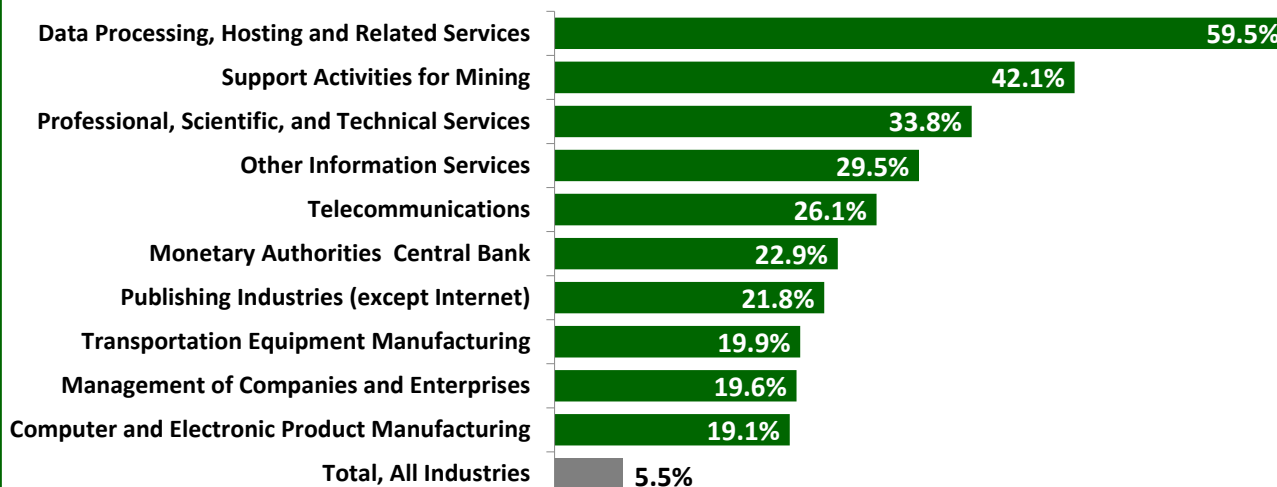
STEM Occupations in Missouri

There are more than 100 STEM occupations, and they can be found in many different industries. Some occupations are industry specific due to their scope, while other occupations are wide-ranging in their industrial usefulness.

Nine of the top 10 STEM occupations by employment were related to computers, with the *Software Applications Developers* occupation having the largest employment. Overall, STEM occupations make up 5.5 percent of Missouri's total employment. In some industries, however, STEM occupations make up a large percentage of those employed, as those industries are more reliant on the skills and knowledge associated with STEM employment. The *Information* industry sector accounts for four of the top 10 industries with the highest percentage of STEM employment.[1]

STEM Occupations with Highest Employment

Occupation	Employment
Software Developers, Applications	16,011
Computer User Support Specialists	13,712
Computer Systems Analysts	13,300
Network and Computer Systems Administrators	7,821
Computer Occupations, All Other	7,447
Software Developers, Systems Software	6,846
Computer Programmers	6,013
Computer Network Support Specialists	5,935
Industrial Engineers	5,758
Computer and Information Systems Managers	5,671

STEM Percent of Industry Employment

Industry	Percent
Data Processing, Hosting and Related Services	59.5%
Support Activities for Mining	42.1%
Professional, Scientific, and Technical Services	33.8%
Other Information Services	29.5%
Telecommunications	26.1%
Monetary Authorities Central Bank	22.9%
Publishing Industries (except Internet)	21.8%
Transportation Equipment Manufacturing	19.9%
Management of Companies and Enterprises	19.6%
Computer and Electronic Product Manufacturing	19.1%
Total, All Industries	5.5%

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1   *STEM occupational and industry data is from the 2018 base year employment of the 2018-2028 projections. Industry data is at the 3-digit subsector level of the North American Industry Classification System (NAICS).*
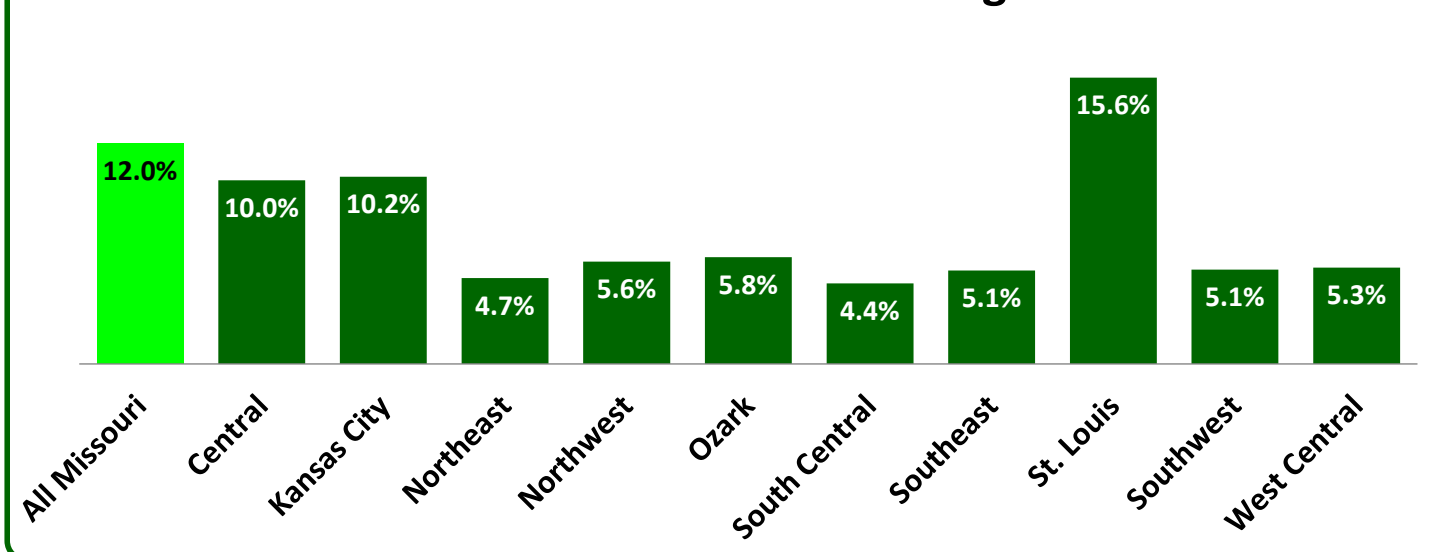
STEM Location Quotent

Location Quotients (LQ) describe the concentration of an occupation or industry in a geographic region, in relation to the nation, with 1.0 being the national average. Location quotients (LQ) higher than 1.0 indicate a higher concentration in Missouri, relative to the United States, while LQs lower than 1.0 indicate lower concentrations. The most concentrated STEM occupation in Missouri is *Animal Scientists* (LQ 2.53). *Computer Network Support Specialists* is an occupation that has a high LQ, as well as a high number of projected job openings, with over 500 each year.

Occupation	2018 Estimated Employment	2028 Projected Employment	2018-2028 Percent Change	2018-2028 Annual Openings	2018 Wages Average Wage	2018 Location Quotient
STEM Occupations with Highest Location Quotient						
Animal Scientists	132	140	6.1%	16	$81,780	**2.53**
Computer Network Support Specialists	5,935	6,134	3.4%	515	$55,910	**1.63**
Soil and Plant Scientists	504	541	7.3%	62	$53,030	**1.46**
Electrical and Electronics Drafters	705	729	3.4%	76	$61,420	**1.46**
Anthropologists and Archeologists	175	187	6.9%	22	$56,880	**1.46**
Geographers	39	40	2.6%	4	$76,320	**1.40**
Atmospheric and Space Scientists	261	291	11.5%	30	$95,500	**1.37**
Information Security Analysts	2,892	3,977	37.5%	352	$91,210	**1.35**
Web Developers	4,021	4,668	16.1%	395	$65,090	**1.32**
Conservation Scientists	581	585	0.7%	60	$57,580	**1.28**

STEM Job Postings

From March 1, 2020, to Feb. 28, 2021, there were more than 72,000 online job postings for STEM occupations in Missouri, making up 12 percent of total job postings in the state. The top five employers with the most STEM job ads were The Boeing Company, IBM, Washington University, Wells Fargo, and Bayer Corporation. The St. Louis Workforce Development Area (WDA) had the highest number, as well as the highest percentage, of STEM job postings.

STEM Job Postings as Percent of Total Job Postings

Region	Percent
All Missouri	12.0%
Central	10.0%
Kansas City	10.2%
Northeast	4.7%
Northwest	5.6%
Ozark	5.8%
South Central	4.4%
Southeast	5.1%
St. Louis	15.6%
Southwest	5.1%
West Central	5.3%

The STEM occupations with the most job postings were *Applications Software Developers* and *Computer Occupations*, *All Other*, with over 13,000 each. All of the top 10 occupations with the most job postings also have average wages that are higher than the state average of $46,460 for all occupations. This is consistent with STEM occupations generally having higher wages than non-STEM occupations.

Top STEM Occupations with most Job Postings

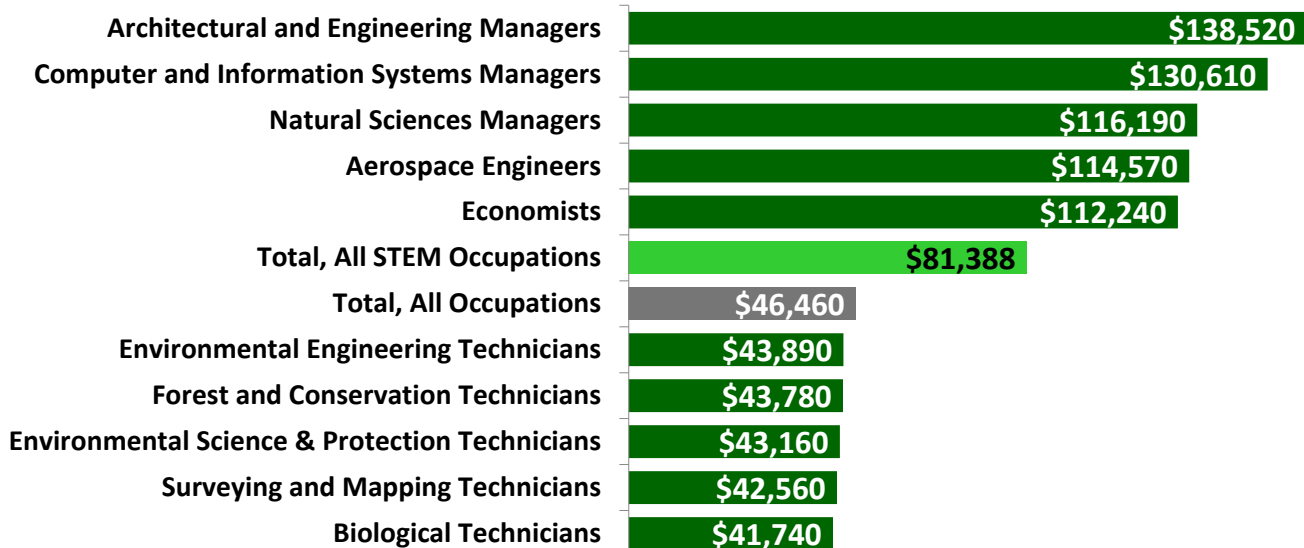| Occupation	2018 Estimated Employment	2028 Projected Employment	2018-2028 Percent Change	Annual Openings	2018 Average Wage	2020 Job Postings
Software Developers, Applications	16,011	20,320	26.9%	1,710	$93,880	**13,968**
Computer Occupations, All Other	7,447	8,305	11.5%	657	$82,610	**13,606**
Computer User Support Specialists	13,712	15,336	11.8%	1,353	$47,600	**4,433**
Computer Systems Analysts	13,300	15,062	13.3%	1,200	$83,720	**3,242**
Information Security Analysts	2,892	3,977	37.5%	352	$91,210	**2,511**
Web Developers	4,021	4,668	16.1%	395	$65,090	**2,102**
Database Administrators	2,832	3,042	7.4%	230	$86,660	**2,014**
Network and Computer Systems Administrators	7,821	8,240	5.4%	603	$82,160	**1,778**
Operations Research Analysts	1,612	1,975	22.5%	153	$77,210	**1,733**
Engineers, All Other	1,264	1,346	6.5%	98	$86,850	**1,664**

In addition to large numbers of job postings over the last year, all of the top 10 occupations are projected to have growth rates that are higher than the state average of 4.5 percent for all occupations from 2018-2028. This indicates that not only are these STEM jobs in demand now, but they are also projected to be in demand for years to come.

STEM Earnings and Growth

STEM occupations can be found in many different industries throughout Missouri and are also some of the highest paying jobs in the state. As a group, STEM occupations earn 75 percent more than the Missouri average. In 2018, STEM occupations accounted for 5.5 percent of Missouri's total workforce, but these same occupations are projected to compose 12.7 percent of the statewide employment growth from 2018-2028. Missouri's projected growth rate for all STEM occupations is 10.2 percent during that same time frame. Compare this to the overall projected growth rate for the state of 4.5 percent, and it is clear that STEM occupations are an important part of the state's economic growth.

Similar to other occupations, STEM occupations requiring a higher level of education usually pay more than those that do not. The 10 highest paid STEM occupations require a bachelor's degree or higher, and half of the top 10 require an education beyond a bachelor's degree.

STEM Highest and Lowest Average Wages

Occupation	Average Wage
Architectural and Engineering Managers	$138,520
Computer and Information Systems Managers	$130,610
Natural Sciences Managers	$116,190
Aerospace Engineers	$114,570
Economists	$112,240
Total, All STEM Occupations	$81,388
Total, All Occupations	$46,460
Environmental Engineering Technicians	$43,890
Forest and Conservation Technicians	$43,780
Environmental Science & Protection Technicians	$43,160
Surveying and Mapping Technicians	$42,560
Biological Technicians	$41,740

Of the more than 100 STEM occupations in Missouri, only five have an average wage below the state average. With higher than average wages, broad industrial appeal, and fast growth rates, STEM occupations are a strong part of Missouri's economy. STEM occupations provide quality jobs now, and are also projected to be a valuable part of Missouri's employment future.

STEM Occupations with most Projected Annual Openings 2018-2028						
Occupation	**2018**	**2028**	**2018-2028**			**2018**
	Estimated Employment	**Projected Employment**	**Net Change**	**Percent Change**	**Annual Openings**	**Average Wage**
Software Developers, Applications	16,011	20,320	4,309	26.9%	**1,710**	$93,880
Computer User Support Specialists	13,712	15,336	1,624	11.8%	**1,353**	$47,600
Computer Systems Analysts	13,300	15,062	1,762	13.3%	**1,200**	$83,720
Computer Occupations, All Other	7,447	8,305	858	11.5%	**657**	$82,610
Sales Representatives, Technical and Scientific Products	5,576	6,028	452	8.1%	**653**	$84,150
Network and Computer Systems Administrators	7,821	8,240	419	5.4%	**603**	$82,160
Software Developers, Systems Software	6,846	7,700	854	12.5%	**597**	$94,140
Computer and Information Systems Managers	5,671	6,348	677	11.9%	**537**	$130,610
Computer Network Support Specialists	5,935	6,134	199	3.4%	**515**	$55,910
Industrial Engineers	5,758	6,396	638	11.1%	**479**	$87,620

As computers, software, automation, and other forms of technology become increasingly important in our everyday personal and work lives, the demand for workers who can create and maintain these new advances will continue to be on the rise. Eight of the top 10 STEM occupations with the greatest number of projected openings are related to computers.

As innovations create new demands in the workplace, employees and job seekers with education and training in the areas of Science, Technology, Engineering, and Math will be in high demand. These skills are valuable within their own fields of expertise, and areas such as Health Care and Manufacturing also have an increasing need for STEM employment. With a solid foundation of employment, wages, and growth, STEM occupations have established themselves as an important part of Missouri's economic future.

STEM Occupations by Education

The key to meeting the increased demand for STEM-skilled employees is education. There are 115 occupations classified as STEM in the state of Missouri, and all but one requires education beyond the high school level, and 76 percent of all projected STEM job openings require a bachelor's degree or more.

STEM Occupations by Educational Requirement

| Graduate	Bachelor's	Associate/Post HS	High School
34	58	22	1
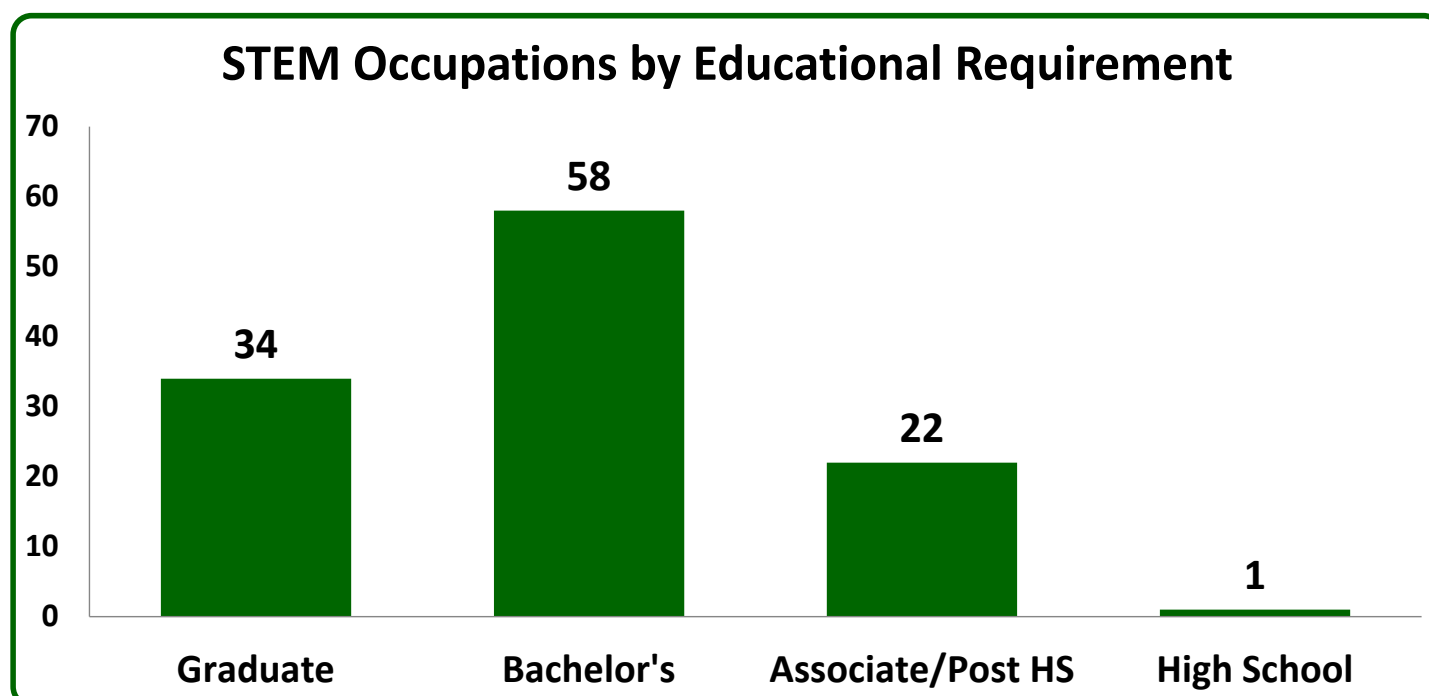
Workers employed in STEM occupations that typically require an associate degree or postsecondary certificate outearn their non-STEM counterparts. On average, occupations that typically require an education beyond high school, but short of a bachelor's degree, earn $53,437 a year in STEM occupations. Conversely, non-STEM occupations, with the same education requirement, earn on average $39,862 a year. This means that in a typical year, people who focus their education and work experience in areas related to STEM occupations earn 34 percent more than their non-STEM coworkers. These middle-skilled occupations are found in the *Computer and Mathematical; Architecture and Engineering;* and *Life, Physical, and Social Science* major occupation groups.

Annual Wages by Education
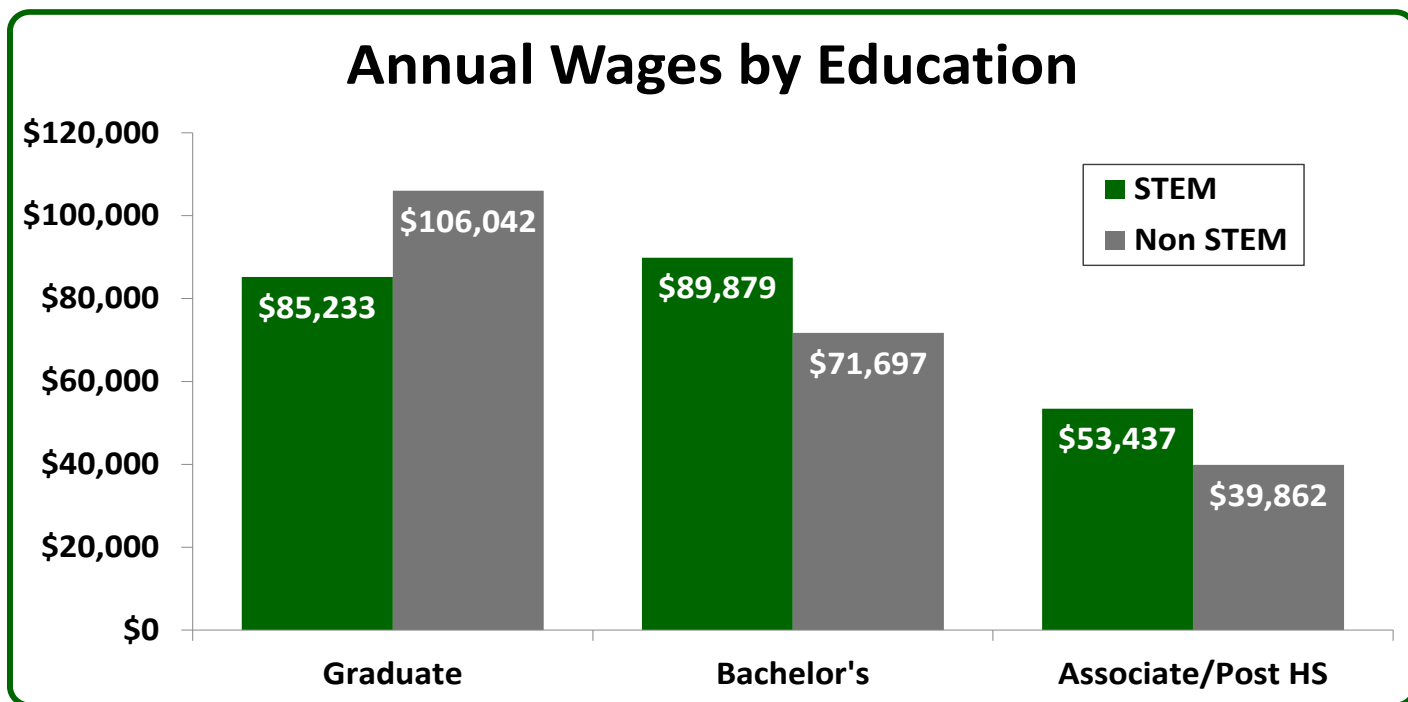
The advantages of a STEM education in Missouri continue at the bachelor's degree level. STEM occupations that typically require a bachelor's degree earn an average of 25 percent more than their non-STEM counterparts. The growth rate for STEM occupations at this educational level also outpaces non-STEM occupations.

The wage advantages of STEM occupations do not extend into occupations that require a graduate degree, however. This could be due to the fact that STEM occupations requiring a graduate degree are more heavily concentrated in the major occupation group of *Education, Training and Library*, while *Legal and Management* occupations represent a higher percentage of non-STEM graduate degree occupations. *Legal and Management* occupations generally earn a higher wage than *Education, Training and Library* occupations.

STEM occupations that typically require a level of education beyond high school and up to a bachelor's degree are projected to have higher rates of growth than non-STEM occupations from 2018-2028. STEM occupations that require a graduate degree are projected to have a lower growth rate than non-STEM occupations requiring the same education.

Projected Growth Rate by Education
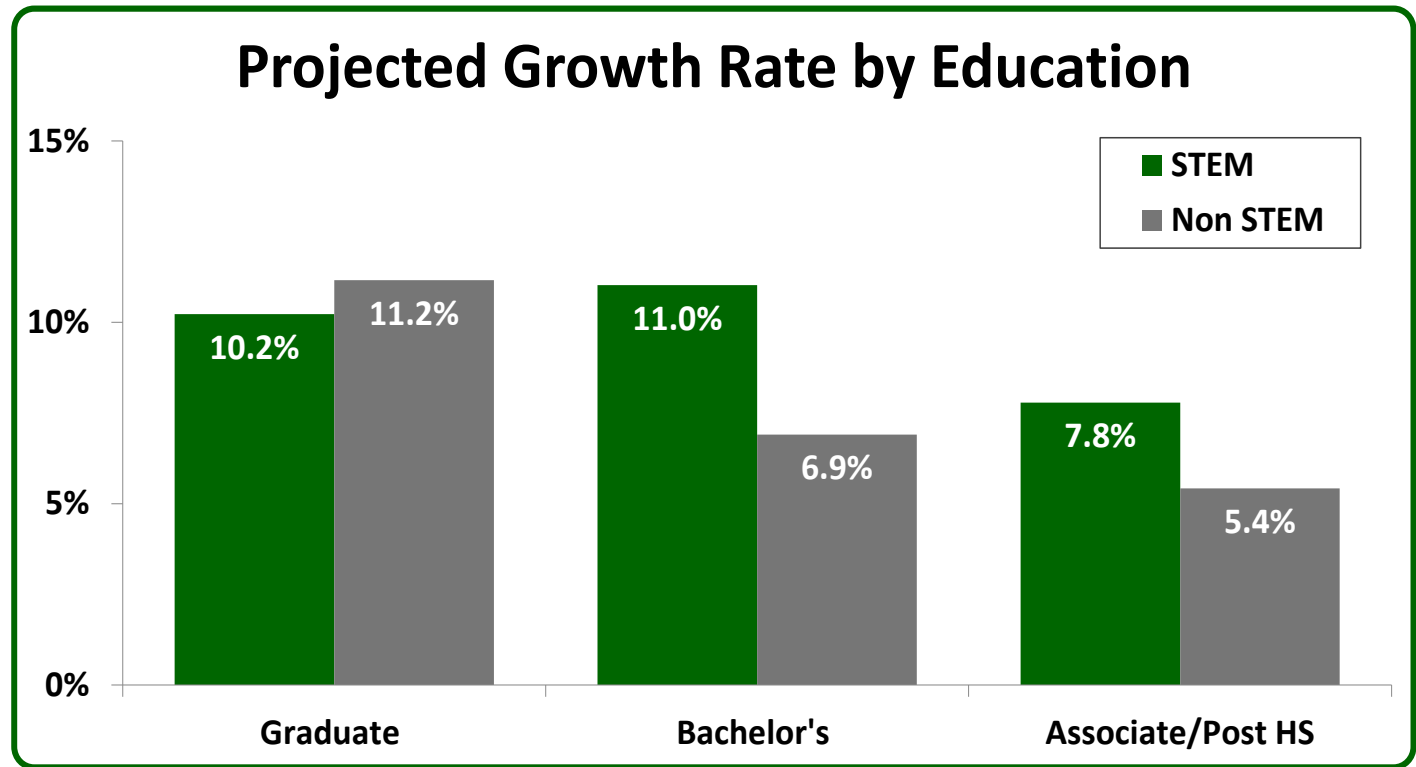
The advantages of a STEM occupation are most obvious at the bachelor's degree level. There are 58 STEM occupations that require a bachelor's degree, including 21 that can be found in the *Life, Physical, and Social Science* occupation group. Another 20 occupations are in the *Architecture and Engineering* occupation group.

STEM Bachelor's Degree Occupations
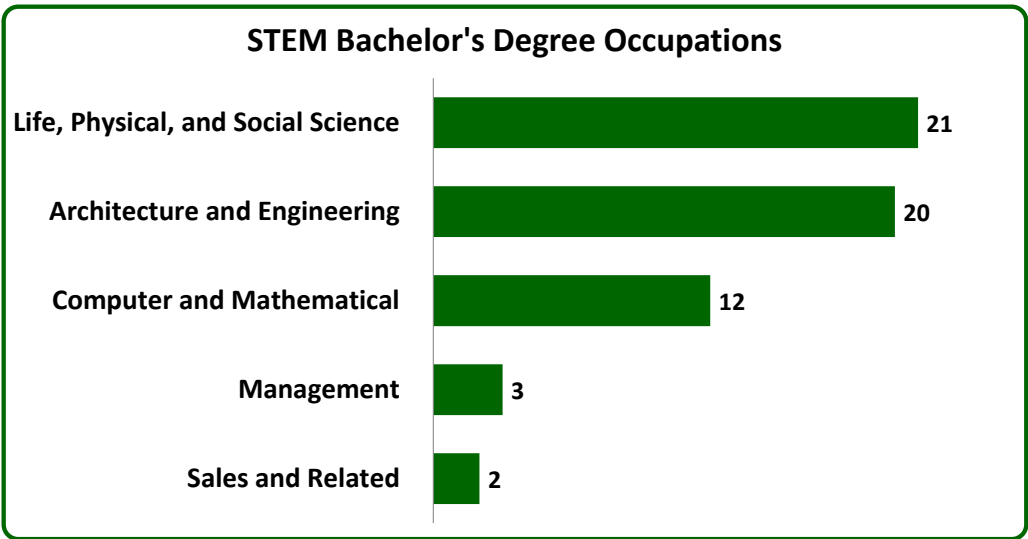
There is a continued need for STEM education to be an important part of Missouri's school curriculum from elementary school to high school and beyond. This emphasis is supported by state cooperative programs such as the Missouri AfterSchool Network, a system designed to improve, support, and sustain high quality after school programs.

A STEM-focused education continues into high school and is further supported by organizations such as the Missouri Math and Science Coalition, which works to bring educators, businesses, government agencies, and community organizations together for the purpose of improving Missouri's STEM education and employment. Beyond high school, scholarship programs have been established in Missouri to help those pursuing a degree in STEM-related fields.
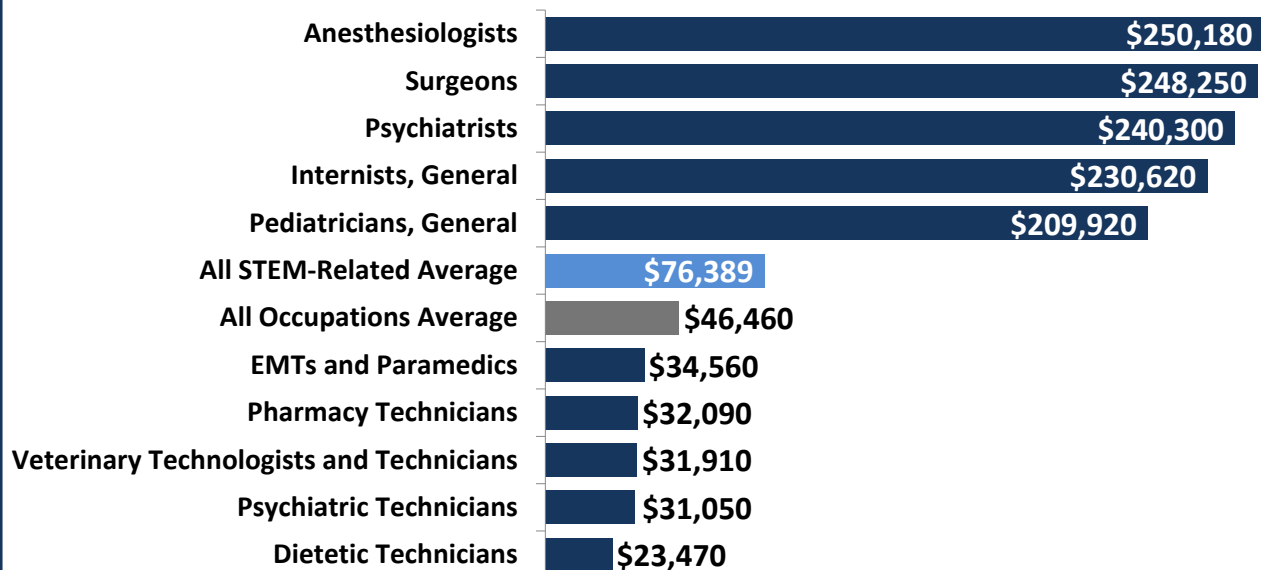
STEM-Related Occupations in Missouri

STEM-Related occupations rely heavily on many of the STEM principles, but are focused on design and patient care and are in the fields of Architecture and Health Care. There are 66 STEM-Related occupations in Missouri. The top 10 largest employed STEM-Related occupations are all in the Health Care and Therapy fields, as are the top 10 STEM-Related occupations with the most projected total openings.

Occupation	2018 Estimated Employment	2028 Projected Employment	2018-2028 Net Change	Percent Change	Annual Openings	2018 Wages Average Wage
Registered Nurses	74,688	86,821	12,133	16.2%	**5,525**	$65,130
Licensed Practical and Licensed Vocational Nurses	15,971	17,029	1,058	6.6%	**1,363**	$42,580
Pharmacy Technicians	9,790	10,712	922	9.4%	**918**	$32,090
Medical and Health Services Managers	7,419	8,665	1,246	16.8%	**762**	$113,120
Clinical Laboratory Technologists and Technicians	9,788	10,848	1,060	10.8%	**756**	$48,850
Health Specialties Teachers, Postsecondary	4,706	5,823	1,117	23.7%	**548**	$148,840
Emergency Medical Technicians and Paramedics	7,062	7,495	433	6.1%	**527**	$34,560
Nurse Practitioners	4,583	5,935	1,352	29.5%	**416**	$102,470
Medical Records and Health Information Technicians	5,191	5,788	597	11.5%	**410**	$42,460
Dental Hygienists	4,040	4,467	427	10.6%	**329**	$68,820

Table title: STEM-Related Occupations with most Projected Annual Openings 2018-2028

The average wage for all STEM-Related occupations is $76,389. While lower than the average wage for all STEM occupations, it is still considerably higher than the state average of $46,460 for all occupations. In fact, 79 percent of all STEM-Related occupations earn more than the state average.

STEM-Related Highest and Lowest Average Wages

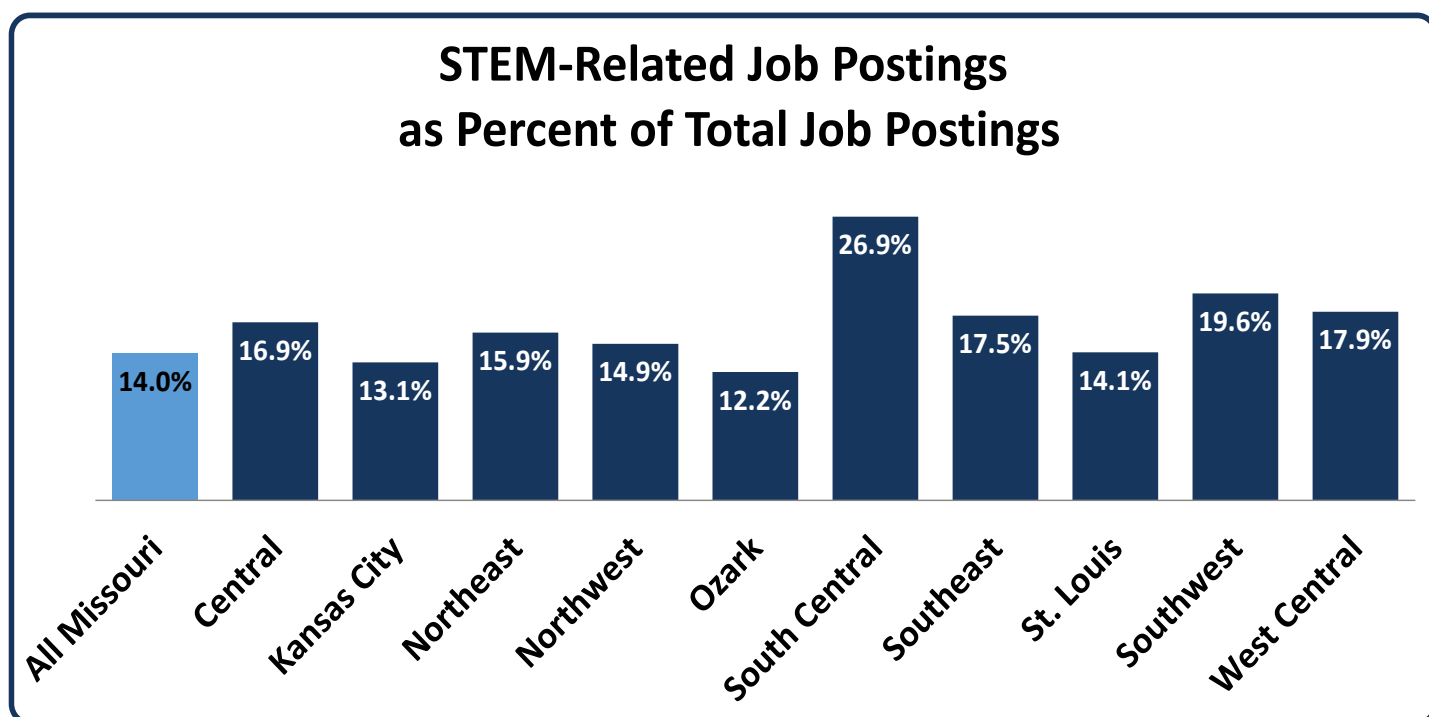| Occupation	Average Wage
Anesthesiologists	$250,180
Surgeons	$248,250
Psychiatrists	$240,300
Internists, General	$230,620
Pediatricians, General	$209,920
All STEM-Related Average	$76,389
All Occupations Average	$46,460
EMTs and Paramedics	$34,560
Pharmacy Technicians	$32,090
Veterinary Technologists and Technicians	$31,910
Psychiatric Technicians	$31,050
Dietetic Technicians	$23,470

STEM-Related Location Quotient

The most concentrated STEM-Related occupation in the state is *Family and General Practitioners*, with a Location Quotient of 2.22. The occupation of *Registered Nurses* has a high LQ, as well as a high number of projected openings, with more than 5,500 each year. While most of the STEM-Related occupations with high LQs require an education of a bachelor's degree or higher, some only require an associate degree. The occupations of *Respiratory Therapists* and *Nuclear Medicine Technologists* can be entered into with an associate degree and also have above average wages.

STEM-Related Occupations with Highest Location Quotient						
Occupation	**2018** Estimated Employment	**2028** Projected Employment	**2018-2028** Percent Change	**2018-2028** Annual Openings	**2018 Wages** Average Wage	**2018** Location Quotient
Family and General Practitioners	5,334	5,935	11.3%	224	$191,110	**2.22**
Surgeons	1,368	1,381	1.0%	41	$248,250	**1.89**
Recreational Therapists	652	683	4.8%	35	$46,000	**1.73**
Dietetic Technicians	1,069	1,079	0.9%	88	$23,470	**1.62**
Clinical Laboratory Technologists and Technicians	9,788	10,848	10.8%	756	$48,850	**1.55**
Emergency Medical Technicians and Paramedics	7,062	7,495	6.1%	527	$34,560	**1.42**
Nurse Anesthetists	1,131	1,328	17.4%	81	$159,080	**1.32**
Respiratory Therapists	3,354	4,308	28.4%	297	$56,320	**1.32**
Nuclear Medicine Technologists	475	532	12.0%	33	$75,680	**1.31**
Registered Nurses	74,688	86,821	16.2%	5,525	$65,130	**1.29**

STEM-Related Job Postings

From March 1, 2020, to Feb. 28, 2021, there were almost 84,000 online job postings for STEM-Related occupations in Missouri, making up 14 percent of total job postings in the state. The top five employers with the most STEM-Related job ads were SSM Health, BJC HealthCare, Mercy Health, Saint Luke's Health System, and Hospital Corporation of America. While the St. Louis WDA had the largest number of STEM-Related job postings, the South Central WDA had the highest percentage of STEM-Related job postings.

STEM-Related Job Postings as Percent of Total Job Postings

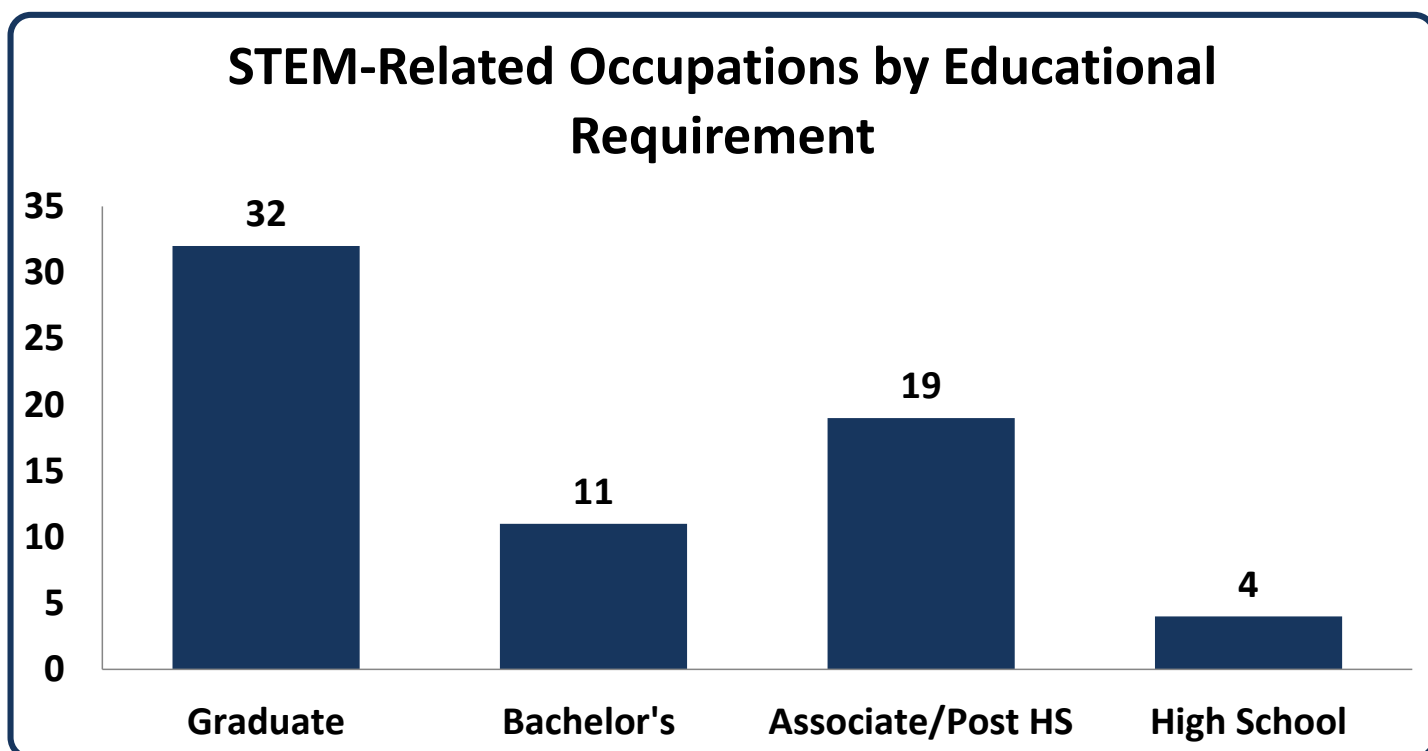| Region	Percent
All Missouri	14.0%
Central	16.9%
Kansas City	13.1%
Northeast	15.9%
Northwest	14.9%
Ozark	12.2%
South Central	26.9%
Southeast	17.5%
St. Louis	14.1%
Southwest	19.6%
West Central	17.9%

The STEM-Related occupation with the most job postings was *Registered Nurses* (34,000 postings). All of the top 10 STEM-Related occupations with the most job postings are also projected to have growth rates that are higher than the state average of 4.5 percent for all occupations from 2018-2028. This indicates that not only are these STEM-Related jobs in demand now, but they are also projected to be in demand for years to come.

| Top STEM-Related Occupations with most Job Postings						
Occupation	2018 Estimated Employment	2028 Projected Employment	2018-2028 Percent Change	2018-2028 Annual Openings	2018 Average Wage	2020 Job Postings
Registered Nurses	74,688	86,821	16.2%	5,525	$65,130	34,145
Medical and Health Services Managers	7,419	8,665	16.8%	762	$113,120	6,798
Licensed Practical and Licensed Vocational Nurses	15,971	17,029	6.6%	1,363	$42,580	6,012
Clinical Laboratory Technologists and Technicians	9,788	10,848	10.8%	756	$48,850	3,275
Health Technologists and Technicians, All Other	2,278	2,674	17.4%	208	$46,580	3,138
Physicians and Surgeons, All Other	5,404	5,893	9.1%	214	$203,440	2,572
Medical Records and Health Information Technicians	5,191	5,788	11.5%	410	$42,460	2,546
Pharmacy Technicians	9,790	10,712	9.4%	918	$32,090	2,038
Physical Therapists	4,884	5,803	18.8%	315	$81,330	1,537
Nurse Practitioners	4,583	5,935	29.5%	416	$102,470	1,494

STEM-Related Occupations by Education

The vast majority of STEM-Related occupations require some form of education or training beyond a high school diploma. In fact, 62 of the 66 STEM-Related occupations require an education beyond the high school level and 43 occupations require a bachelor's degree or more.

STEM-Related Occupations by Educational Requirement

A bar chart showing the number of STEM-Related occupations by educational requirement:
- Graduate: 32
- Bachelor's: 11
- Associate/Post HS: 19
- High School: 4

At the highest degree levels, master's and doctoral degrees, the wage advantages of a STEM-Related occupation are the most obvious. STEM-Related occupations that typically require a graduate degree earn an average of $136,779 annually, compared to an average of $78,527 for non-STEM-Related occupations requiring a graduate degree.

Annual Wages by Education

STEM-Related occupations are expected to be an important part of the workforce of the future. The 2018-2028 projected average growth rate for all STEM-Related occupations is 13.4 percent, which is almost three times the overall projected growth rate for all occupations. STEM-Related occupations at all education levels are projected to grow faster than the state average for non-STEM-Related occupations.

Projected Growth Rate by Education
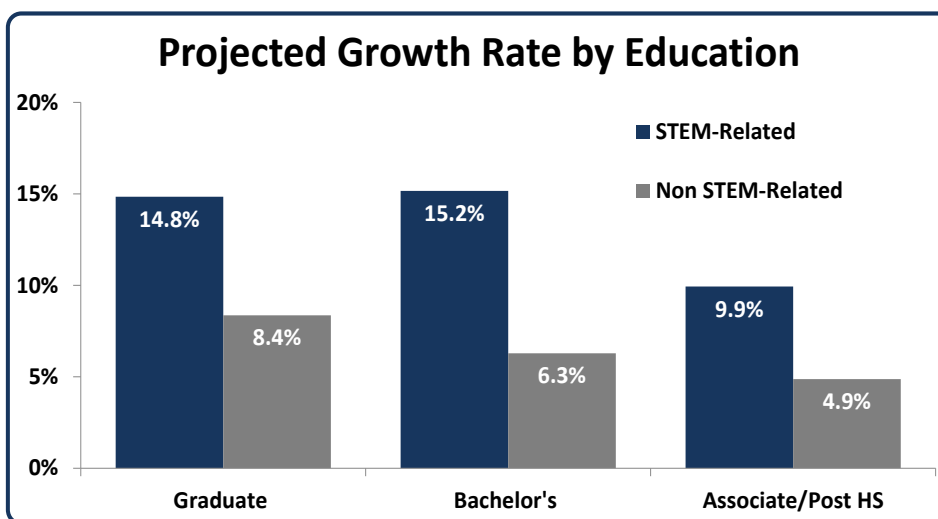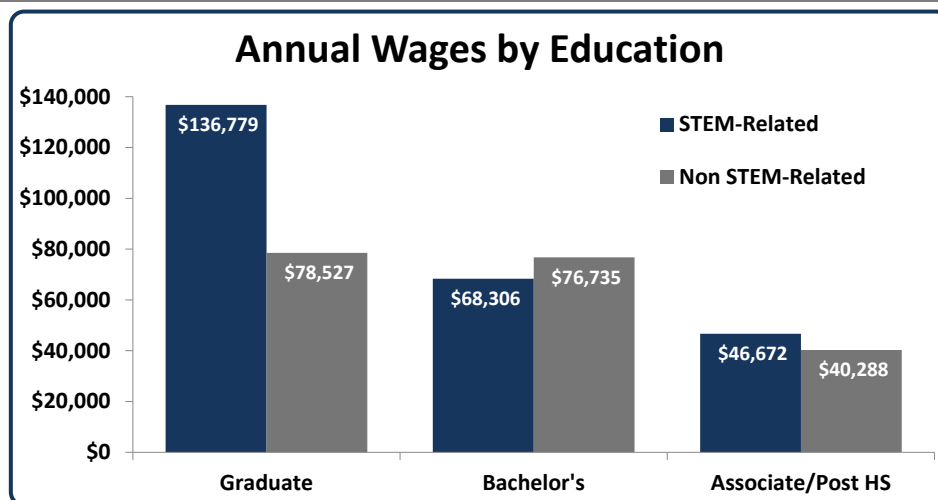
Continued investment in education is required for STEM and STEM-Related occupations and is a key part of Missouri's employment future. As more occupations place an emphasis on the knowledge and experiences found within these disciplines, the demand for these skills will increase.

Notes

MERIC uses the definitions developed by the Standard Occupational Classification Policy Committee (SOCPC) to classify occupations as STEM or STEM-Related. The SOCPC is comprised of representatives from the Department of Labor, Bureau of Labor Statistics and Employment Training Administration; the Department of Commerce, Census Bureau; the Department of Defense, Defense Manpower Data Center; the Equal Employment Opportunity Commission; the Department of Health and Human Services, Health Resources and Services Administration; the Department of Education, National Center for Education Statistics; and the National Science Foundation, National Center for Science and Engineering Statistics. The SOCPC was organized at the request of the Office of Management and Budget to create standard guidelines for the classification of STEM and STEM-Related occupations.

STEM definitions were developed by the SOCPC using the 2010 Standard Occupational Classification (SOC) system.[1] This report covers those occupations determined by the committee to be STEM occupations.[2] The SOCPC divided STEM occupations into two domains and four sub-domains. Occupations in the sub-domains of *Life and Physical Science, Engineering, Mathematics, Information Technology*; and *Social Science* are designated as "STEM Core" or just "STEM". Occupations in the sub-domains of *Architecture* and *Health* are designated as "STEM-Related."

With the implementation of the 2018 SOC structure, starting with the 2019 OES estimates and 2020-2030 employment projections, the SOC codes that are classified as STEM will change.[3] These are almost all due to SOC code changes from the 2010 to 2018 SOC system, and not due to the SOCPC redefining which occupations it considers to be STEM. The exceptions are the occupations of *Occupational Health and Safety Specialists* and *Occupational Health and Safety Technicians*, both of which were considered to be STEM occupations according to the 2010 SOC STEM list, but not the 2018 SOC STEM list.[4]

Sources

- U.S. Bureau of Labor Statistics (BLS) Occupational Projections used to define typical education and training requirements.
- U.S. BLS Division of Occupational Employment and Wage Statistics (OEWS) data used to define STEM occupations and wages.
- Occupational and Industry Employment Projections developed by the Missouri Economic Research and Information Center (MERIC).
- Labor Insight (Burning Glass Technologies) used for job postings data.

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Endnotes

1   *Attachment A: Options for defining STEM (Science, Technology, Engineering, and Mathematics) occupations under the 2018 Standard Occupational Classification (SOC) system. Retrieved April 2021 from https://www.bls.gov/soc/Attachment_A_STEM_2018.pdf*
2   *Attachment C: Detailed 2010 SOC occupations included in STEM SOC Policy Committee recommendation to OMB. Retrieved October 2020 from https://www.bls.gov/soc/attachment_c_stem.pdf*
3   *Attachment A: SOC Policy Committee recommendations regarding STEM definition. Retrieved October, 2020 from https://www.bls.gov/soc/Attachment_A_STEM.pdf*
4   *Attachment C: Detailed 2018 SOC occupations included in STEM SOC Policy Committee recommendation to OMB. Retrieved April 2021 from https://www.bls.gov/soc/Attachment_C_STEM_2018.pdf*